



Reprocessing NOAA's Geo-Polar blended 5km SST from 2004-2014

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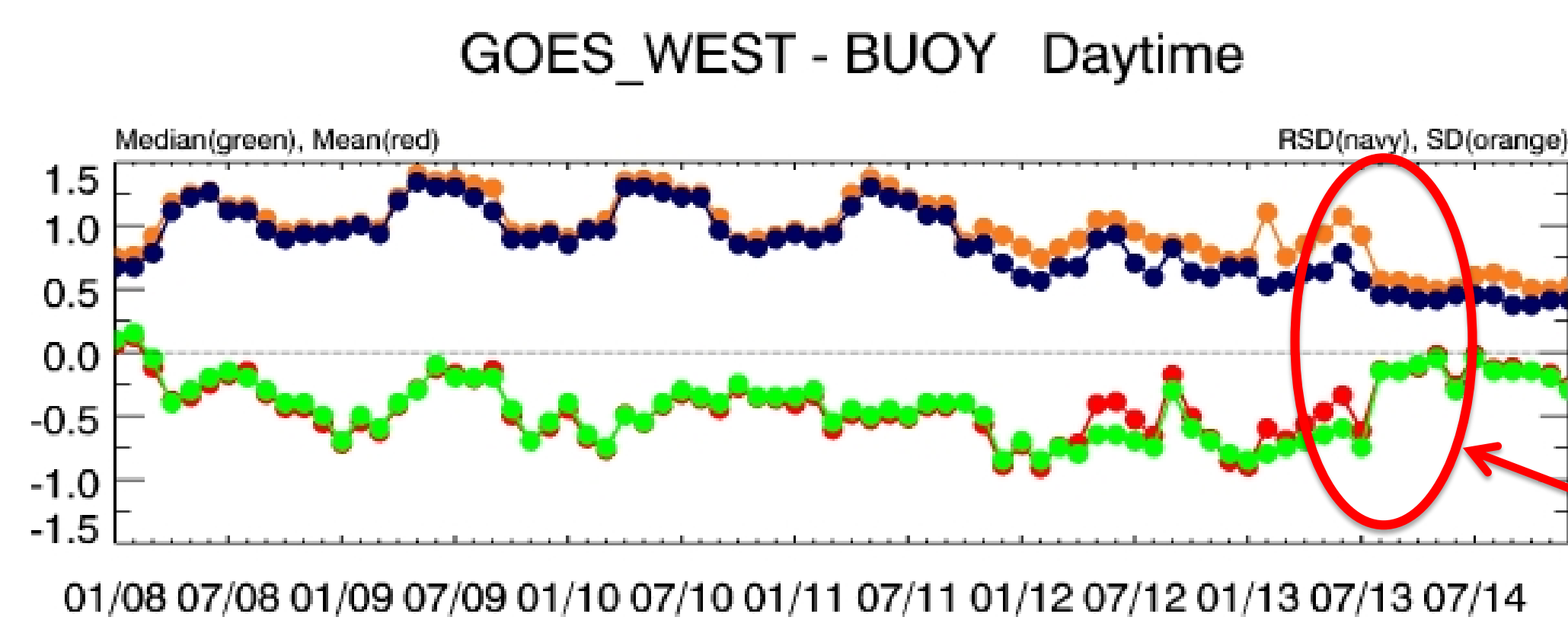
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Abstract

Efforts are being carried out at NOAA/NESDIS/STAR to reprocess the global geostationary and polar orbiting 5km SST data using state-of-the-art NOAA operational algorithms from 2004 to present. For geostationary data, the latest operational algorithm calculates SST by utilizing a new physical retrieval scheme based on modified total least squares (MTLS, Koner *et al.*, 2014) and a probabilistic (Bayesian) approach for cloud masking (Merchant *et al.*, 2005). The geostationary satellites being reprocessed include GOES (GOES-9, 10, 11, 12, 13 & 15) satellites from NOAA, MTSAT (MTSAT-1-R and MTSAT-2) satellites from Japan Meteorological Agency (JMA), and also Meteosat (8, 9 and 10) from Eumetsat during the 10-year period. The total raw data volume for geostationary sensors that will be reprocessed is ~200TB in various data formats (HRIT, GVAR, MCIDAS Area File). Reprocessed geostationary SST provides a near complete coverage of the tropics and mid-latitudes with at least hourly time resolution. For the polar orbiting satellites, AVHRR and METOP data are being reprocessed using the Advanced Clear-Sky Processor for Oceans (ASCPO) (Petrenko *et al.*, 2010). The geostationary and polar data are then combined to generate the Geo-Polar blended 5-km SST daily global SST analysis. All level-2 and level-4 products are being validated against global drifting buoy and tropical mooring data, which is archived in NOAA in-situ SST quality monitor (iQuam).

Reprocessing utilizes the new physical retrieval scheme

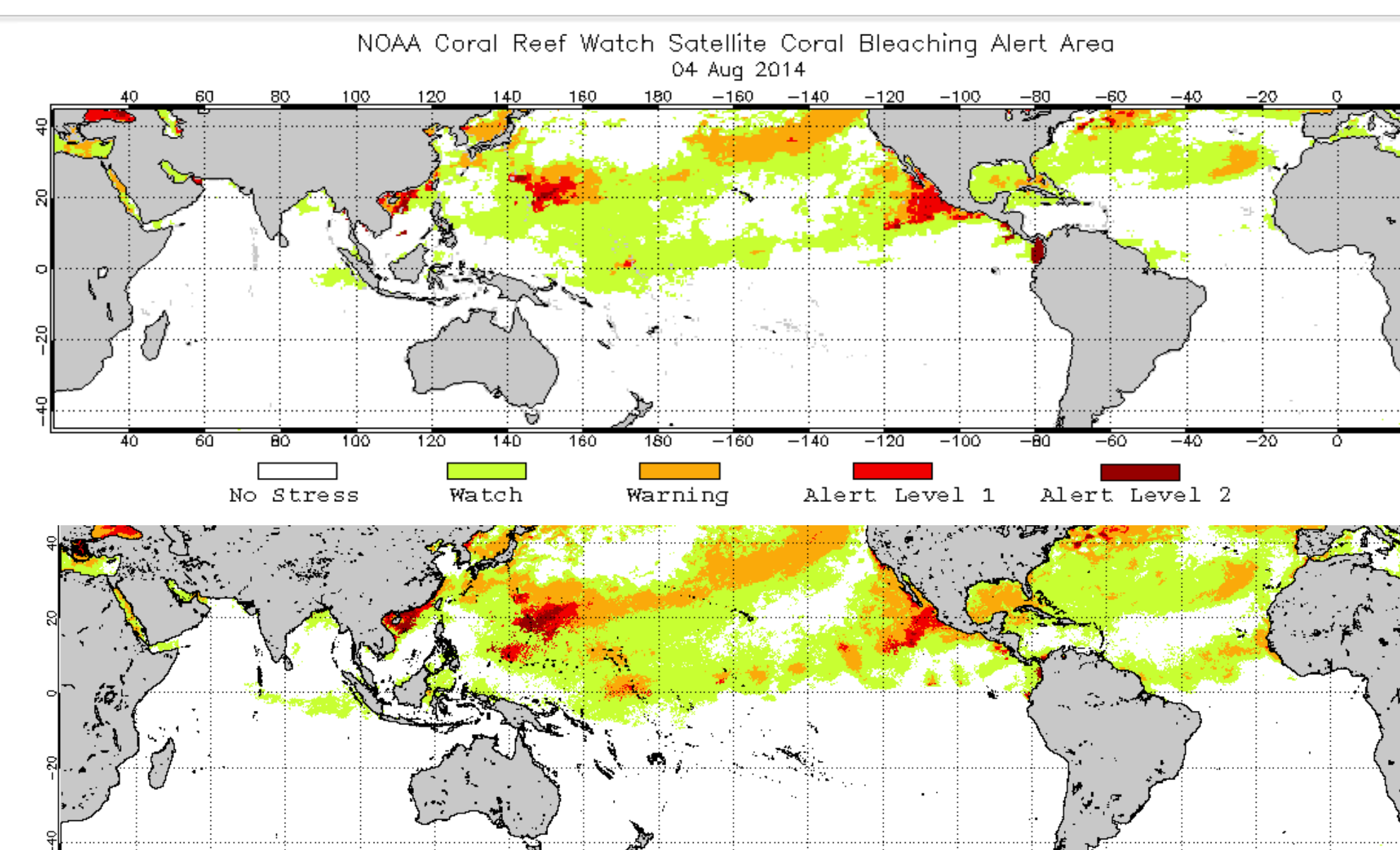


Significant statistical improvement when switched to the new MTLS (Koner *et al.*, 2014 submitted) retrieval scheme, in July 2013

Time series of the monthly statistics of GOES-West and buoy comparisons. The mean (red) and standard deviation (orange) values, along with median (green) and robust standard deviation (navy) are given.

Reprocessing will provide an improved 5km global coral maximum monthly SST climatology for coral bleaching prediction at Coral Reef Watch program in NOAA

The current operational SST climatology is based on a twice-weekly 50-km AVHRR SST analysis that was developed in the 1980s, the new algorithm will update it to 5km hourly resolution. We need at least 10-year of reprocessing to generate a climatology. So far there is one 'experimental' climatology which is based on only 2 year data.



August 4th, 2014 Bleaching alert based on the operational 50km SST climatology

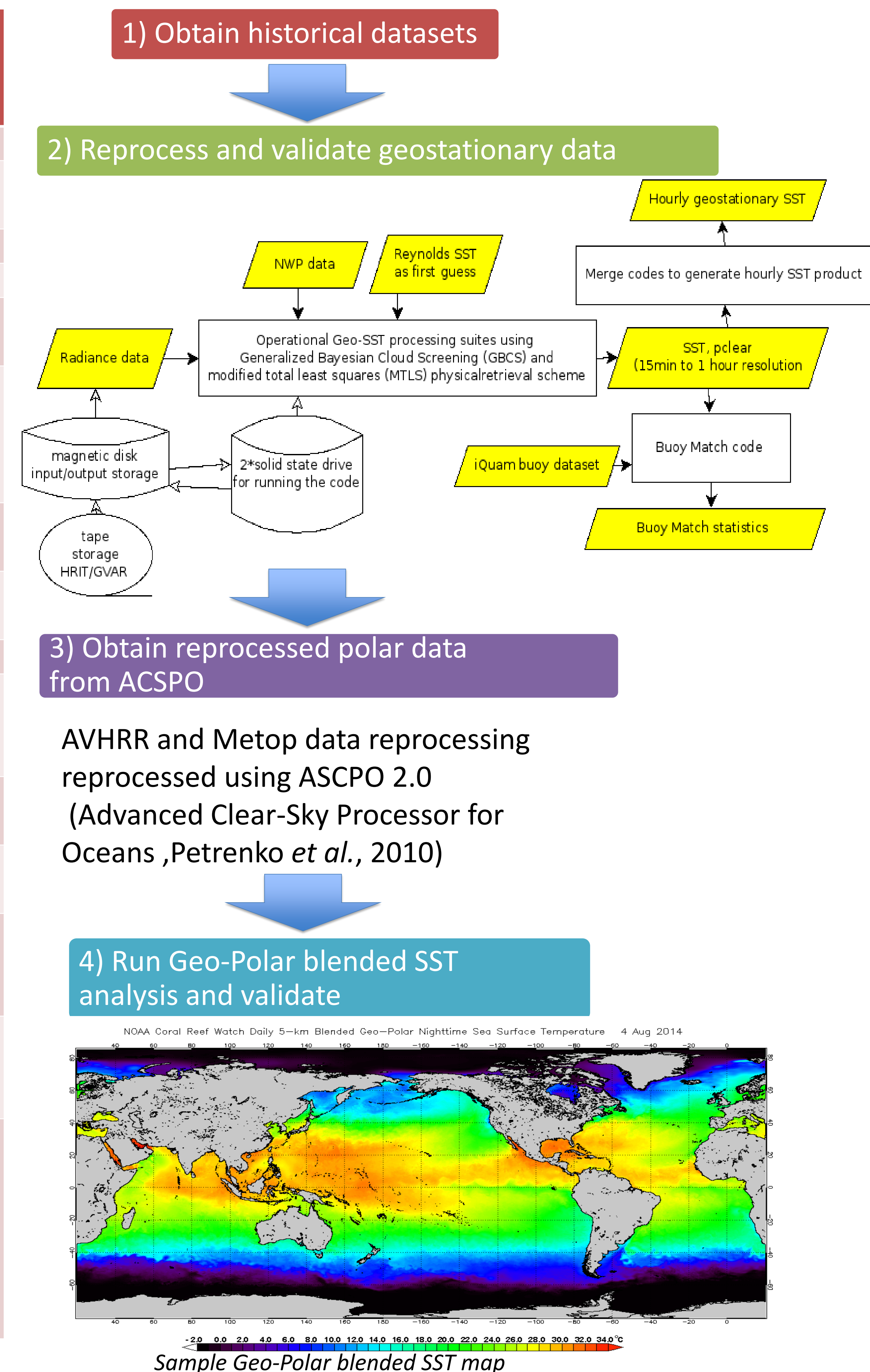
More details and larger affected areas can be seen from the bleaching alert based on the 'experimental' 5km SST climatology

historical datasets for geostationary SST reprocessing

Input data type	Products and Agencies	Platforms	Time length	Data format we have
Radiance data	GOES-East (75° W), NOAA/USA	GOES 12	2004-2010	GVAR
		GOES 13	2010-present	McIDAS Areafile
		GOES 10	2004-2006	GVAR
		GOES 11	2006-2011	GVAR
	GOES-West (135°W), NOAA/USA	GOES 15	2011-present	McIDAS Areafile
		GOES 9	2004-2005	GVAR
		(substitute for failed MTSAT-1)		
	MTSAT, JMA/Japan (140°E)	MTSAT-1R	2005-2010	HRIT
		MTSAT-2	2010-2014	McIDAS Areafile
		MSG (Meteosat Second Generation), Eumetsat/Europe	Meteosat 8 2004-2006 Meteosat 9 2006-2012 Meteosat 10 2012-present	HRIT HRIT +McIDAS Areafile McIDAS Areafile
NWP field data	NCEP GFS 26-level, NOAA/NCEP		2004-present	HDF
Reference SST fields	Reynolds 0.25 degree, NOAA/NCDC		2004-present	HDF
buoy dataset	iQuam drifter and tropical mooring dataset, NOAA/NESDIS		2004-present	NetCDF

Table.1 Input and validation data sets data needed for reprocessing and validating the geostationary SST reprocessing from 2004 to present. All radiance data needed to be converted to McIDAS AREA files for input.

Approach



References

C. Merchant, A. Harris, E. Maturi, and S. Maccallum. Probabilistic physically based cloud screening of satellite infrared imagery for operational sea surface temperature retrieval. *Q. J. R. Meteorol. Soc.* (2005), 131, pp. 2735–2755